Laura Bowman

From: official information
Sent: Thursday, 21 April 2022 1:52 pm
To: [redacted]
Cc: official information
Subject: Final Response: LGOIMA 254995 [redacted] - Copy of the 'Road Safety Audit' referred to in the Hamilton City Council "Conditions to apply to the Notice of Requirement in Hamilton City (HCC 168A)"
Attachments: PSP 17482 - Peacocke Strategic Transport - Stage 3 Road Safety Audit RSA - Designer and HCC response - Client SIGNED.PDF

Kia Ora,

I refer to your **information request below**, Hamilton City Council is able to provide the following response.

Question
Please provide a copy of the 'Road Safety Audit' referred to in the document 'Hamilton City Council Conditions to apply to the Notice of Requirement in Hamilton City (HCC 168A)' amended as of 26 April 2020.

Answer
HCC Designation A106 Condition 24.2 requires that:

> *"In managing traffic safety effects across the whole of the Project (or staged Project) at the detailed design stage, the Requiring Authority shall undertake a Road Safety Audit for the relevant stage of the Project in accordance with NZ Transport Agency's Road Safety Audit (RSA) for Projects. A copy of the RSA shall be provided to the Territorial Authority Chief Executive or nominee."*

Please find attached the final Road Safety Audit for the Peacocke Strategic Transport component of the Project, the current relevant stage.

Road Safety Audits will be completed on future stages of the Southern Links Transport network as they are progressed through detailed design.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Kind Regards,

Official Information Team
Legal Services & Risk | People and Organisational Performance
Email: officialinformation@hcc.govt.nz

From: [redacted]
Sent: Wednesday, 23 February 2022 1:10 pm
To: official information <officialinformation@hcc.govt.nz>
Subject: Request for official information Southern Links/ Peacocke Structure Plan Area

To: Hamilton City Council,

Re: Southern Links / Peacocke Structure Plan Area Waikato River bridge construction traffic safety effects

Please provide a copy of the 'Road Safety Audit' referred to in the document 'Hamilton City Council Conditions to apply to the Notice of Requirement in Hamilton City (HCC 168A)' amended as of 26 April 2020.

Regards,

[redacted]
Fitzroy Neighbourhood Group

[redacted]
Phone [redacted] or [redacted]

Peacocke Strategic Transport Project

Detailed Design Road Safety Audit

Prepared for: Hamilton City Council

Contact Details

Name: Keith Moyes

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Document Details:

Date : January 2020
Reference: 232891.00
Status: Final

Prepared by:

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Appendix A:

Documents Examined During the Audit

Document History and Status

Revision	Date	Author	Reviewed by	Status
0	31/01/2020	KDM	CM and GC	Final

Revision Details

Revision	Details
0	Final version of audit.

1 Background

1.1 Safety Audit Procedure

A road safety audit is a term used internationally to describe an independent review of a future road project to identify any safety concerns that may affect the safety performance. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.), carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, that is, minimisation of death and serious injury. The road safety audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the Safety Audit Team.

The key objective of a road safety audit is summarised as:

> *To deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project.*

A road safety audit should desirably be undertaken at project milestones such as:

- Concept Stage (part of Business Case).
- Scheme or Preliminary Design Stage (part of Pre-Implementation).
- Detailed Design Stage (Pre-implementation / Implementation).
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A road safety audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines. Any recommended treatment of an identified safety concern is intended to be indicative only, and to focus the designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the *"NZTA Road Safety Audit Procedures for Projects Guidelines - Interim release May 2013"* the audit report should be submitted to the client who will instruct the designer to respond. The designer should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team recommendation that is accepted, the client shall make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the designer, safety engineer and client for each issue documenting the designer response, client decision (and asset manager's comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer's response to the client and the client's decision on each recommendation shall be given to the road SAT leader as part of the important feedback loop. The road SAT leader will disseminate this to team members.

1.2 Safety Audit Methodology

The road safety audit was carried by:

- Cherie Mason – WSP - Hamilton Office (Team Leader);
- Keith Moyes – WSP - Hamilton Office (Team Member); and
- Glenn Coppard – WSP - Wellington Office (Team Member).

The detailed design safety audit was based solely on examining the detailed design drawings did not involve a site visit. The audit was carried out using the Stage 3 Detailed Design Stage Safety Audit checklists and was in accordance with requirements set out in the NZ Transport Agency's Safety Audit Procedures for Projects document (May 2013).

1.3 Report Format

The potential road safety problems identified have been ranked as follows:

- The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and type of vehicle involved.
- Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.
- The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Concern Assessment Rating Matrix in Table 1-1 below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1-1: Concern Assessment Rating Matrix

Severity (likelihood of death or serious injury)	Frequency (probability of a crash)			
	Frequent 10 or more crashes per 10 years	Common 6-9 crashes per 10 years	Occasional 2-5 crashes per 10 years	Infrequent 1 crash or less per 10 years
Very likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very unlikely	Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each concern category is given in Table 1-2.

Table 1-2: Concern Categories

Concern	Suggested Action
Serious	A major safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate concern that should be addressed to improve safety.
Minor	Minor concern that should be addressed where practical to improve safety.

In addition to the ranked safety issues it is appropriate for the (SAT) to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. A comment may include items where the safety implications are not yet clear due to insufficient detail for the stage of project, items outside the scope of the audit such as existing issues not impacted by the project or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instances, suggestions may be given by the auditors.

1.4 Scope of Audit

This audit is a Detailed Design Road Safety Audit of the Peacocke Strategic Transport Project located within the Hamilton City urban area. The construction drawings were produced by Bloxam Burnett and Olliver (BBO) on behalf of Hamilton City Council (HCC).

Note the road safety audit excluded waste water, watermain, utility services and traffic signal phasing.

1.5 Documents Provided

The (SAT) were provided with the following documents for this audit:

- Peacocke Strategic Transport Project drawings (Preliminary 95% Design Issue): Project Number 145900-001A: Sheets 1000 to 6510.

1.6 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SAT. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe, and no warranty is implied that all safety issues have been identified in this report. Safety audits do not constitute a design review nor an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the SAT or their organisations.

1.7 Project Description

This greenfield project consists of constructing a new roading network (arterial and local roads) to enable the Peacockes area to be developed for future residential development.

The project proposes a 60 km/h speed limit on the arterial roads (Ring Road Extension) and a 40 km/h speed limit on the local roads.

The project provides:

- Linking into the SH1/Wairere Drive interchange at the northern end with a signalised intersection and extending the ring road (Wairere Drive) further south.
- A new 180 m long bridge crossing the Waikato River with a 3.5 m shared path on the LHS, two 4.2 m wide public transport lanes, two 3.3 m wide traffic lanes, a 1.2 m wide painted median, a 2.5 wide cycle path on the RHS and a 2 m wide pedestrian path on the RHS. The bridge has TL5 F-profile concrete barriers with elliptical steel top rails separating the traffic lanes from the pedestrians and has 1.4 m high balustrades along each side.
- A new 71 m long bridge for pedestrians and cyclists crossing Wairere Drive north of the new Waikato River Bridge. This bridge has a horizontal curve combined with up to a 4.2% vertical gradient and is 4.18 m wide between the 1.4 m high balustrades and has a 2% crossfall.
- A roundabout with four pedestrian underpasses at the ring road extension/Peacockes Road intersection.
- A signalised intersection with a raised platform at the Peacockes Road/Weston Lea Drive East/Peacockes Lane intersection.
- A raised platform at the Peacockes Road Westbrook intersection.
- Bus lanes on the ring road extension and Waikato River Bridge.
- Bus stops and raised pedestrian crossing platforms within the through traffic lanes on Peacockes Road.
- Narrowing the ring road extension from two lanes in each direction to one lane in each direction west of Peacockes road to the North/South arterial intersection (no intersection details provided).
- Parallel parking on Peacockes Road; and
- Cycle and shared pedestrian/cycle paths.

2 Safety Audit Findings

2.1 Previous Safety Advice

WSP has been providing safety advice to the designers as the project has developed. The following issues were raised, and recommendations were made; noting this is not an exhaustive list, just a few key findings, outcomes and any other items that could be considered further.

- Preliminary Discussions:
  - A design note memo detailing the geometric design speed in the vertical context and approach (attached) concluding the adoption of the 60kmh design speed for the vertical context of the Ring Road Extension would be supported in this isolated situation. No further issues have been identified related to this.
- Concept Design:
  - Whilst the SAT agreed in principle with the bus stop in the middle of the road, further questions were asked whether it should be located before the zebra crossing to improve safety. This was confirmed by BBO that this was based on good guidance. The SAT still believe there is merit in discussing this further. Other issues were the potential for queuing behind these buses may result in intersection and rear end issues (refer section 2.4.5)
  - The shared path, pedestrian path and cycle lane interconnectivity and way finding needs to be addressed and ensure that shared paths commence, connect and terminate at logical locations (refer section 2.4.2). It was also agreed a separate study on the wider mobility issues was to be carried to identify these issues. The SAT felt the detailed design drawings had not covered this issue and required wayfinding details should be considered further.
  - The normal/crowned road cross-section was previously noted that no super elevation was evident on any of the horizontal curves used, and that curve radii less than the minimum for adverse cross fall had been used. We understand this is the intention, and the designer was to supply supporting information that the resulting friction demand was acceptable. We received initial feedback from BBO via email which agreed this was adequate; however, no formal documentation e.g. Departure Approval from HCC or a Design Report stating as such was provided.
  - Connection in to the North/South Arterial. The SAT asked how this arterial connects into the Ring Road Extension. Response from BBO indicated that this is not in the NLTP and no intersection form has therefore been discussed. Further comment on this and how the 'end of the road' messaging to road users was provided by BBO as 'threshold treatments at tie-in and positioning of tie-ins at locations with clear sightlines". This does not seem to have been addressed in the detailed design. Refer to section 2.3.2.
  - Speed Management of Share Paths. The SAT discussed that with the significant increases in the number of e-bikes and e-scooters being used, whether speed management of shared facilities had been considered. BBO agreed that is was an issue that was discussed, but to date there is no clear direction on this. There has been no update on this provided within the detailed design and still need consideration. HCC Safety Engineer suggest designing for a 30 km/h sight distance for these users, unsure how this differs to cars etc.
  - Wider Mobility issues – we understood a separate study was been completed for the wider mobility issues within the area. Whilst we have picked up some of these issues, this information has not been provided to us at the time of the audit.

2.2 Detailed Design Safety Audit

The SAT identified the following safety issues associated with the detailed design.

2.3 Intersections

2.3.1 Peacockes Road/Ring Road Extension Guardrail and Underpasses Locations

Moderate

1 The barrier drawings (sheet 2902) show TL3 W section barrier is proposed on the Peacockes Road/Ring Road Extension roundabout (central island and perimeter) above the pedestrian underpasses. The drawings state the installation is to be in accordance with curved barriers as detailed on NZTA RSB 2A. The SAT are concerned that although this is a 60 km/h speed limit, the TL3 barrier may be inadequate; Also, noting that TL4 Thrie beam has been used on the Southern Links East/West arterial which has a similar roundabout/underpass layout on the same network. There are no details shown on how the guardrail will be anchored.

2 The path of vehicle overshooting the give way on both the Ring Road Extension and Peacockes Road are directly above the pedestrian underpasses. Based on observations at other sites within HCC network where barrier is located above an underpass, the post can be ripped off the base (depending on the type of mounting) in a crash and become a hazard to pedestrians and cyclists below.

Recommendations:

1 Show the central island guardrail mounting details on the drawings and consider upgrading to TL4 Thrie beam to provide adequate protection and consistency with other installations on the same network.

2 Consider relocating the underpasses so as they are not in line with the give way approaches or ensure the guardrail posts cannot detach when hit in a crash.

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Infrequent	*Death or serious injury is Likely*	*Moderate*

Designer Response:

1. The designers acknowledge the SAT comments regarding the use of TL4 barrier. Although a TL4 barrier provides greater containment, the barrier is less forgiving should it be struck by an errant vehicle and isn't typically able to be installed with intermediate anchors. In addition, the thrie-beam is significantly more difficult/expensive to replace in the event of it being struck, which has operational issues. We also acknowledge that the SH3 roundabout project has used central island thrie-beam, but the approaching speed environment (particularly from SH3 south) is a lot more prone to higher approach speeds (significant downgrade on largely rural high speed corridor) and will have considerably larger numbers of HCV's etc. In contrast, this roundabout will be within a fully urbanised setting and is consistent with the approach taken on other roundabouts along the same corridor (such as Wairere/Gordonton etc). We therefore believe the containment level is suitable for this environment, and is an approach that is more consistent with the system used elsewhere on the City network. We will clarify the drawings to show the barriers being a driven weak post system; intermediate anchors will be installed as per NZTA RSB-2A, with the apex of the curve considered to be in relation to the approach lanes.

2. The location of the underpasses are such that they provide desirable paths for cyclists and pedestrians and provide ideal sightlines on approaches to conflict areas. Repositioning of the underpasses without significant impact on the designated footprint, or change to philosophy of a centrally based ped/cycle exchange. Adequate depth over the underpasses have been provided to enable posts to be driven weak posts that yield on impact, as opposed to shearing and potential displacement/detachment if connected to a beam (or similar).

Safety Engineer: Click here to enter text.

Client Decision: Agree with the Designers response, but also understand the concerns raised by the SAT. The examples used by the SAT are roundabouts with very high approach speeds with the approach lane aligned more towards the centre of the roundabout, rather than tangential resulting in very tight curves on the entry into the roundabout resulting in loss of control type crashes into the central island. In this case the design does not have the same tight radii on the approaches which is less likely to result in crashes that are directed perpendicular to the central median barrier.

Action Taken: As per Client's decision, the design has been updated as per designer response.

2.3.2 North/South Arterial and Ring Road Extension Intersection

Minor

The drawings show that works for the Ring Road Extension terminates at the North/South Arterial Intersection but there are no details of this intersection layout provided. However, we understand that this is not noted within the NLTP (i.e. within 10-year timeframe) and the intersection form has not been determined. If the ring road extension does terminate at this location, there is no signage indicating the road ends or provision to turn. In addition, the SAT are concerned about CPTED in these locations, with potential for a 'dead-end' road being open with free access leading to anti-social behaviour/boy-racers congregating, safety issues and potential damage to infrastructure / etc.

Recommendation:

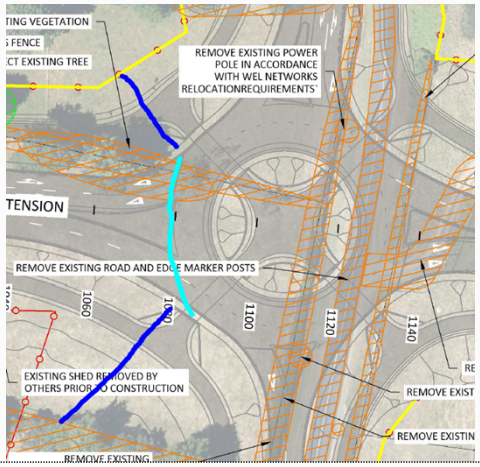
Provide turning facilities and signage to ensure drivers are aware of the road termination. Consider measures to reduce the potential for anti-social behaviour in this location.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be infrequent	***Death or serious injury is Unlikely***	***Minor***

Designer Response: We expect that more certainty of the future extension to Ring Road (to enable ongoing connectivity to rest of network) will be known at the time of construction being completed. If no linkage is provided at time of completing the works we agree that gating and/or a turnaround facility should be provided. In the meantime, the design has been developed so that gates/fences/turnaround areas can be constructed if/when needed. Pedestrian continuity is proposed to connect through to existing paths on Peacockes Road near the water treatment plant – this is desirable from an active mode connectivity position, but accept that CPTED issues will need to be monitored. In this regard we note that the corridor is being fully-lit and path connections via the N4 pump station will be similarly lit for P3 purposes. HCC to confirm if they prefer that no pedestrian connections are provided (from Peacockes Road roundabout to the N4 pump station), until future road connections are continuous.

Safety Engineer: Click here to enter text.

Client Decision: Agree with both the SAT and the Designers response. If the extension can not be connected we wold prefer that the whole area is isolated, by way of fencing or temporary barriers, rather than leaving a short stub for anti-social behaviour. Suggested barrier locations are illustrated in the image below.



Action Taken: Based on the uncertainty of future development timing, the fencing of this area will be determined toward the end of construction. Should no connection be in place, temporary fencing/barriers will be installed as indicated in the client decision with the option of providing a pedestrian/cycle connection to the existing network.

2.3.3 *Cobham Drive and Ring Road Extension Intersection*

Minor

The drawings show that works for the Ring Road Extension commence at the Cobham Drive intersection and remarking will occur in conjunction with this project. However, it is not clear on the drawings where the raised intersection platform terminates on the Cobham Drive westbound on ramp.

Recommendation:
Show the location and markings for the Cobham Drive Westbound on ramp raised intersection platform on the drawings.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Unlikely***	***Minor***

Designer Response: The scope of works for this project has been amended so that the complete intersection is to be constructed as part of the Wairere/Cobham Interchange Project. This will ensure continuity of markings related to the westbound on-ramp.

Safety Engineer: Click here to enter text.

Client Decision: Agree with Designers response.

Action Taken: As per Client's decision, the design has been updated as per designer response.

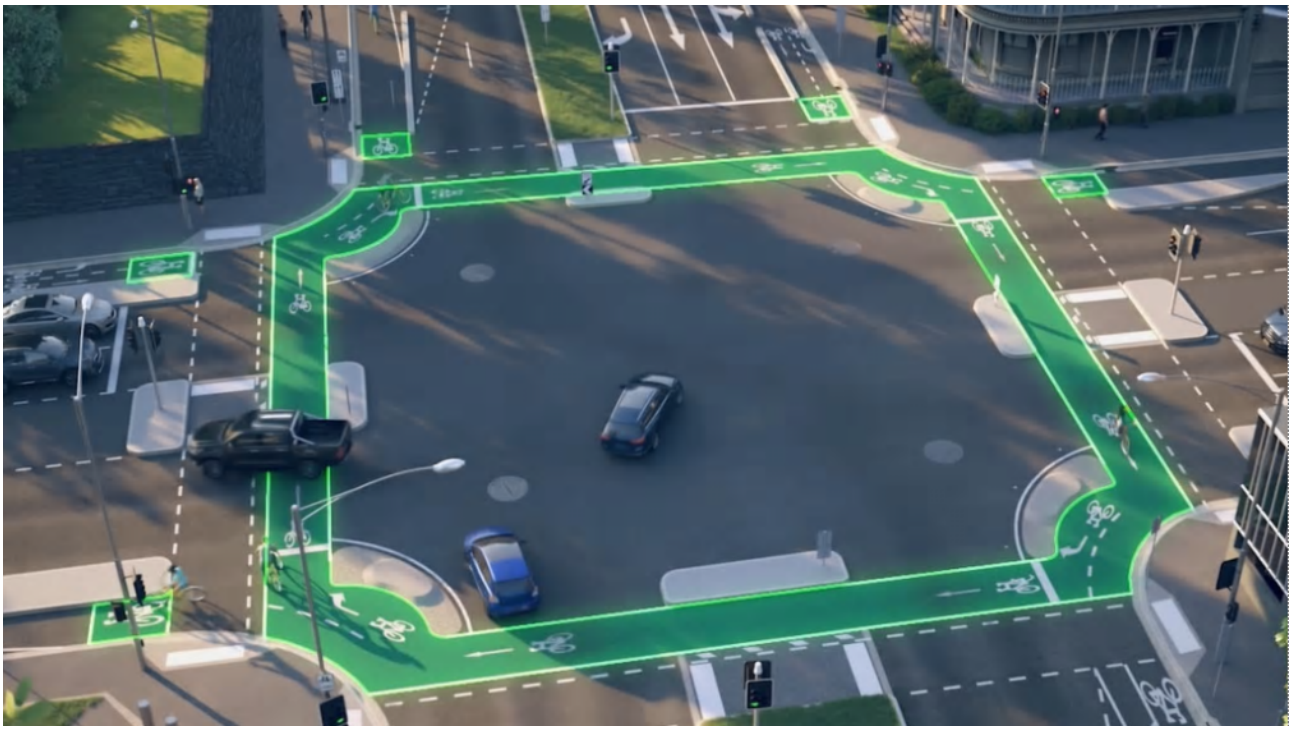
2.3.4 *Peacockes Road, Weston Lea Drive East and Peacockes Lane Intersection layout*

Significant

1 The intersection shows small physical islands in each corner of the intersection to aid cyclists and ensure they use the cycle crossing facilities at the intersection. The SAT noted the following issues associated with the design: It appears that the shape of the islands will mean they are likely to be regularly hit by left turning vehicles (particularly HCVS).

2 The signals design relies on loops to detect cyclists, but the pavement markings do not show limit lines where cyclists should stop. Cyclists turning right turn are required to carry out the manoeuvre as a two stage (hook turn) movement but this movement is not intuitive with the current markings. The photo shop drawing below shows a similar layout that has been used for a similar intersection in Australia.

3 The cycle lanes on all the entries and exits from this intersection are not marked. In order to minimise confusion and ensure cyclists use the physically separated lanes, the lanes should have green background with cycle symbols.



Recommendations:

1 Investigate removing the islands and if they are required ensure they are redesigned and do not impede the turning paths of HCVs.

2 Modify the intersection cycle lane pavement markings to include limit lines and right turn arrows to make it clear to cyclists where they should stop and how they should be making the right turn movements. As this intersection layout is a new concept, in conjunction with the physical works, consider what other measures could be implemented to inform road users how the facilities should be used. Ensure the traffic signal phasing caters for the cycle right turn movements and include dedicated aspects; and

3 Mark all the cycle lane entries and exits from this intersection with green background and with cycle symbols.

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Common	*Death or serious injury is Likely*	*Significant*

Designer Response: The designer acknowledges the SAT comments regarding this intersection. The intersection design has been amended and the footprint of the intersection increased to address the SAT concerns, as described below (reference also made to Sheet 1255 attached):

1. The islands have been designed with a mountable profile for large vehicles (i.e. 18m semi-trailers). Smaller vehicles (such as buses) will track within the carriageway without mounting the islands. Additional edgeline markings are now provided for guidance.
2. The designer agrees with the SAT and the plans have been amended to show directional markings similar to the example provided. Signal phasing has been adapted to provide enhanced prioritisation toward cyclists, including cycle-dedicated aspects.
3. The designer agrees with the SAT and plans have been updated.

Safety Engineer: Click here to enter text.

Client Decision: Agree with the Designers response to the concerns raised by the SAT, and concede that this would be a new type of intersection in New Zealand and we will be looking at overseas examples between now and construction to see how the design might change following the overseas experiences.

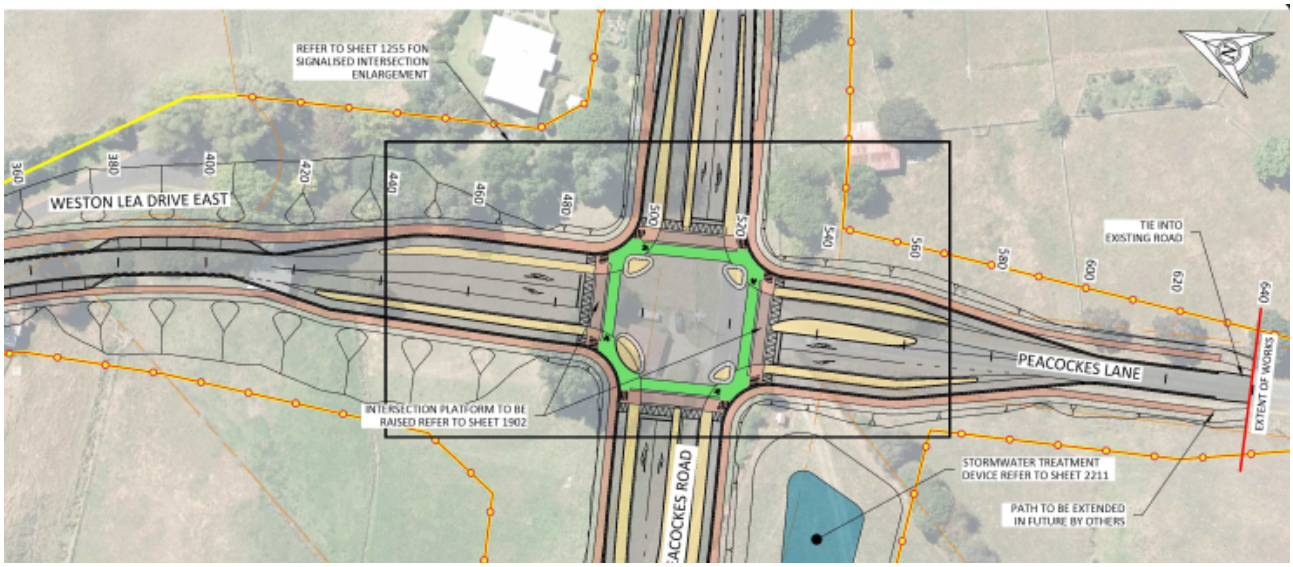
Action Taken: As per Client's decision, the design has been updated as per designer response and subsequent discussion with the HCC Safety Engineer (and various experts, including NZTA). Concerns raised by the SAT have been resolved.

2.3.5 *Peacockes Road, Weston Lea Drive East and Peacockes Lane Intersection Cross Section*

Moderate

1 The proposed road cross sections at the intersection for Weston Lea & Peacocks Lane, are drastically out of kilter with the normal road cross sections. The need for dual approaches appears excessive given the relatively small catchment for traffic generation and dedicated full-green phases (D & E), with the cycle lane segregation islands also contributing to an overly wide cross section. The image below shows differing cross section treatments on the two through roads.

2 Also note the potential for filtered right turns out of Peacockes Lane with the straight and right arrow marking.



Recommendations:

1 Consider reducing the size and length of the cycle-lane separation islands to reduce the abrupt changes in cross section width. Consider re-sequencing signal phasing to allow cyclists to complete the two stage right (hook) turn on sequential phases.

2 Consider remarking the lanes on Peacockes Lane with a dedicated right turn lane and a shared straight through left turn lane similar to Weston Lea Drive East.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Common	***Death or serious injury is Very Unlikely***	***Moderate***

Designer Response: The intersection has been designed to cater for the ultimate development of the Peacocke area. As such, the size of the intersection may appear excessive for the interim flows (particularly Peacockes Lane), but responds to the expected development in this area.

1. The designer acknowledges the SAT comments regarding the apparent abrupt change in cross-section, however, should the separation islands be shortened (in the short-term), the conflict location will be closer to the intersection where a greater number of conflicts/hazards/distractions exist. As development occurs along Peacockes Lane

(expected to be in the short-medium term), the relevant developers will be required to upgrade the cross section to similarly cater for cyclists.

Further to this, we note that the latest signal arrangement has been enhanced to better manage for sequential cycle movements (i.e. to prioritise cyclists).

2. The primary movement from Peacockes Lane (short and long-term) is a left turn movement (i.e. to/from City). Also, having a dedicated left turn lane allows the use of left-turn red display, which provides increased opportunity for dedicated cycle phases within the signal arrangement.

Safety Engineer: Click here to enter text.

Client Decision: Agree with the Designers response to the concerns raised by the SAT, and concede that this would be a new type of intersection in New Zealand and we will be looking at overseas examples between now and construction to see how the design might change following the overseas experiences.

Action Taken: As per Client's decision, the design has been updated as per designer response and subsequent discussion with the HCC Safety Engineer (and various experts, including NZTA). Concerns raised by the SAT have been resolved.

2.3.6 *Dish Channel at Intersection Raised Platforms*

Minor

The raised platforms at Peacockes Rd/Westbrook Place and Peacockes Road/Weston Lea Drive/Peacockes Lane all have dish channel around the internal kerbs and this is potential trip hazard.

Recommendation:

Consider regrading drainage to remove the need for a dish channel and enable flush kerb to be installed.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Occasional	***Death or serious injury is Unlikely***	***Minor***

Designer Response: In order to manage stormwater efficiently, channelisation is required; overland flow across the paths is not a desirable outcome for this project where a strong focus has been to encourage alternative (and specifically active) modes of travel. However, we acknowledge the SAT comments and have now minimised the potential hazard by removing the typical dish channel detail on Sheet 1902, and replacing with a "Pram/Cycle Cutdown" profile (in placement of a dish channel) – refer to updated Sheet 1255 attached, which is location where the detail on Sheet 1902 was relevant.

Safety Engineer: Click here to enter text.

Client Decision: If dish channel needs to be used recommend using Cityheart Extruded Dish Channel profile, top of RITS D3.C1.

Action Taken: As per Client's decision, the design has been updated to include the Cityheart extruded dish channel.

2.4 Cyclists, Pedestrians and Public Transport

2.4.1 *Minor Arterials Cycle Lane/Parking Bay Layout*

Minor

The proposed 2.3 m wide cycle lane layout on minor arterial routes e.g. Peacockes Road has the cycle lane adjacent to kerb and channel separated from 2.3 m wide parallel parking with a 1 m wide segregation strip. There is a physical PVC separator which is 130 mm high at 2 m centres within the 1 m wide segregation strip.

There is no edgeline to provide guidance or separation between the individual marked parallel parking bays and the live traffic lane. MOTSAM Part 2 Figure 2.4 recommends an edgeline 0.6 m minimum and 1 m desirable from the individual marked parallel parking bays.

Although the proposed layout provides the maximum separation between the cyclists and the live traffic lane the SAT are concerned the layout requires the drivers using the parallel parking to open their door into the traffic lane and cross both the segregation strip and the cycle lane to reach the berm and footpath. There is potential for those pedestrians exiting vehicles to trip on the physical separator and be hit by cyclists.

Recommendations:

Consider changing the pavement marking layout so as there is an edgeline 0.6 m minimum from the individual marked parking bays.

Investigate if the cycle lane can continue as an off-road facility adjacent to the foot path thus eliminating the need to install the on road cycle lane with physical PVC separators or if space does not permit (with parking and berm/separation) then continue the 'Shared Paths' and use the intersection as the node to transition cyclist back to on-road cycle lanes.

If on road cycle lane remains and physical separator is required, consider installing kerbs with concrete infill with the 1 m separation strip.

Also, the SAT felt that you could investigate if parking can be accommodated off the arterial road within any adjoining land use / development rather than mostly on the arterial route.

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Occasional	*Death or serious injury is Unlikely*	*Minor*

Designer Response: The typical cross sections for this project have been developed with a lot of input from interested stakeholders and agreed upon with HCC. A strong desire to keep the cyclists as part of the carriageway was to provide clear separation from other transport modes, but also to maximise the versatility of the pavement cross-section in the event space allocation needs to be adjusted in the future (e.g. bus lanes or light rail etc). The adopted cross-section provides the best overall balance of competing demands, as agreed with HCC.

The option for providing an "off-road" facility for cyclists (i.e. away from the live carriageway) was investigated and determined that additional width would be required within the overall cross section (largely constrained within the existing designation) unless shared facilities are adopted. To date, HCC (and stakeholders) have considered it undesirable to have the cyclists in a shared space with pedestrians (except where impracticably constrained), including an arrangement where the two paths would be immediately adjacent to each other. As such, shared facilities have only been included in localised areas where the designation width does not permit the separation or in areas where the cost to separate pedestrians and cyclists was deemed unpracticable (e.g. bridges and underpasses).

We do not agree that an additional 600mm width is needed between parking bays and the traffic lane, nor the inclusion of an additional edgeline. The cross-sectional width is constrained, so any additional width would need to be taken from residual parts of the cross-section, which we believe is less desirable than the relatively low safety risk described by the SAT (i.e. lane widths in excess of minimum and median provided that allows manoeuvring etc).

The uses of solid infilled kerbing (in replacement of PVC separators) is not deemed favourable as it would require a significant increase in drainage infrastructure (with sumps required for the runoff from the traffic lanes and sumps required for the cycle paths and berm area). Concrete kerbing with slots for drainage were considered, however, were a more costly option and concentrated stormwater runoff across the cycle path. On balance we believe we have provided the best overall solution.

Parking will likely be included within adjacent developments. However, we have no control over the timing or development arrangement of those "other" roads. Instead, this design aims to maximise parking based on the likelihood of the land adjacent to Peacockes Road being used for a sports park and a potential school in the

immediate vicinity, and if, in the future, this parking is deemed unnecessary the space can be relocated for other activities (e.g. bus lane).
Safety Engineer: Click here to enter text.
Client Decision: Agree with both the Designer and SAT, the edge line is something that could be added post construction if considered appropriate then. With regards to the separators, it is a balancing act of providing some form of water permeable yet physical barrier and not creating a trip hazard, one could also suggest that a solid continuous barrier could pose a trip hazard as well.
Action Taken: As per Client's decision, the design has remained unchanged, noting that edgelines can be adjusted post construction if deemed necessary as part of the post-construction audit.

2.4.2 Provision for Cyclists on Minor Arterial Roads

Moderate

Parts of the minor arterial cycle route on Peacockes Road north (Ring Road Extension to Weston Lea Drive) requires cyclists to exit the off-road cycle lane, and travel on the carriageway which has no shoulders. There is a 2.5 m wide pedestrian path on the eastern side of Peacockes Road North and as it looks similar to the adjacent of road cycleway it is likely that less experienced cyclists will not leave the path and continue on using the off-road pedestrian facility.

The cycle path treatment in this area is inconsistent as there is a shared path on one side of Weston Lea Drive.

Recommendation:

Consider installing a shared path on both sides of Peacockes Road north between the Ring Road Extension and Weston Lea Drive. If this option is not viable, consider whether cyclists can 'share the lane' and consider measures which help indicate the likely presence of cyclists in this area and look to provide protected transitions for cyclists to enter the carriageway.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Likely***	***Moderate***

Designer Response: The designer acknowledges the SAT concerns and proposes to provide a shared path on both sides of Peacockes Road in this location.
Safety Engineer: Click here to enter text.
Client Decision: Agree with Designers response.
Action Taken: As per Client's decision, the design has been updated as per designer response.

2.4.3 Pedestrian Crossing Layout

Moderate

The proposed pedestrian crossing on Peacockes Road has no stagger within the central refuge island. The SAT are concerned that without a stagger, some users e.g. electric scooter riders could cross the road at speed and not look for approaching traffic.

Recommendation:
Investigate installing a stagger with fences within the Peacockes Road pedestrian crossing central island refuge.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Likely***	***Moderate***

Designer Response: The designer acknowledges the SAT comments, however, HCC have expressed a desire not to have a stagger in the crossing in order to give the appearance and emphasis of prioritisation for pedestrians.

Safety Engineer:	Click here to enter text.
Client Decision:	Acknowledge and agree with the concerns raised by the SAT, but HCC are trying to promote active travel throughout the Peacocke area, installing fencing to corral pedestrians in would go against this. However, in response to this concern the pedestrian crossing has been installed on a raised pedestrian platform designed to at 30 km/h travel speed to ensure that vehicles are travelling slow enough to be more aware of the potential for pedestrians in the area.
Action Taken:	As per Client's decision, the design remains unchanged.

2.4.4 Stairs to Weston Lea Drive West at CH 700 Ring Road Extension

Minor

The drawings show stairs with a cycle runnel to provide access from the Ring Road Extension to Weston Lea Drive West. That SAT are concerned that the stairs make it impossible for wheelchair users to gain access at this location and although there is another access to Weston Lea via Echobank Place most users prefer to use the most direct route. There is limited wayfinding signage for pedestrians and cyclists at this location (refer also section 2.1 Concept Design on wayfinding)

Recommendation:

Investigate if a ramp can be installed between Weston Lea Drive West and the Ring Road Extension and if not install adequate wayfinding signage to ensure those pedestrians and cyclists who do not want to use the stairs are aware of the alternative access location.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Unlikely***	***Minor***

Designer Response:	The designer agrees with the SAT. A ramp is now provided approximately 80m north of Weston Lea Drive (where accessible grades are achievable) in order to provide connectivity for all users (refer to Drawing 1273 attached).
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers response.
Action Taken:	As per Client's decision, the design has been updated as per designer response.

2.4.5 Bus Stop on Peacockes Road

Moderate

The proposed bus stop in Peacockes Road is within the through traffic lane and will require all vehicles following the bus to stop while passengers get on or off the bus. Whilst we agree with the concept to improve safety for pedestrians, the SAT are concerned that approaching vehicles may not realise the bus is stationary.

There is the potential for nose to tail crashes and all tail backs through the intersection; albeit these will likely have low severity outcomes. A stationary bus is likely to use the hazard warning lights at this location and although the drawings do not show if belisha beacons are to be installed on the pedestrian crossing at this location there is the potential for motorists to be confused if numerous flashing lights are visible at night.

Recommendation:

Finalise the lighting/signs design and show if belisha beacons or if fluorescent belisha discs are to be installed on the Peacockes Road pedestrian crossing and consider modifying pedestrian crossing layout (refer section 2.4.3).

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Likely***	***Moderate***

Designer Response:	The designer agrees with the SAT. Plans have been updated to show fluorescent belisha disks at the crossing (refer to drawing 2822 attached – noting this drawing still shows the superseded Peacocke Road/Weston Lea/Peacocke Lane intersection).
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers response.
Action Taken:	As per Client's decision, the design has been updated as per designer response.

2.4.6 Cobham Drive Cycle Lane Exit

Moderate

The drawings do not show if there are any wayfinding signs on Cobham Drive to advise cyclists of the destinations on the Ring Road Extension (refer also section 2.1 Concept Design on wayfinding.

Recommendation:

Ensure that there are wayfinding signs on Cobham Drive to ensure that cyclists are aware of the destinations on the Ring Road Extension.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Likely***	***Moderate***

Designer Response:	The designer acknowledges the SAT comments. Placeholders for way finding have been included within the PST project extents. It is expected that HCC will undertake a wider network project for way finding throughout the Peacocke and surrounding areas. We note that any residual way-finding matters can be readily addressed as part of a post-construction audit (if needed), which will allow for completion of the wider network study and any subsequent changes on the wider road network (such as further development stages) is known.
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with the need to provide clear way finding, but this can only come after areas have been officially named and/or the network is complete enough to allow it.
Action Taken:	As per client decision, this item remains outstanding to be addressed as the development of the area progresses.

2.5 Waikato River Bridge

2.5.1 *Drainage Under the Shared Path Deck*

Minor

The drawings show all stormwater drainage of the Waikato River Bridge is via a cavity under the shared path deck on both sides of the bridge. The SAT noted the following issues:

1 It is not clear how the stormwater discharges at the southern end of the bridge into the piped stormwater system. The SAT are concerned if there is a grate across the shared path it has the potential to be a pedestrian trip hazard.
2 If maintenance is required to clear silt or debris that accumulates within the cavity it is likely the concrete deck panels will require lifting which is likely to require the shared path to be closed.
3 There are no details shown for the removal weathering steel slot drain cover and the final design needs to ensure the direction of the slots are cycle friendly, the slots are not too wide to trap shoes and the gap between the deck panel and the slot drain does not trap cycle tyres.
4 There are LED drivers for the handrail lighting also located within the cavity and if these require maintenance the design needs to ensure they can be easily accessed and not prone to water damage.

Recommendations:

1 Show how the stormwater from bridge is collected and connected to the piped system.
2 Ensure the concrete deck panels are able to be lifted and have the capacity to handle the lifting machinery.
3 Ensure the final design of the slot drain cover is cycle and pedestrian friendly.
4 Ensure the design of the slot drain cover and location of the LED drivers can be readily accessed for maintenance purposes with minimal disruption to the shared path.

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Infrequent	*Death or serious injury is Unlikely*	*Minor*

Designer Response:	Plans have been updated based on SAT comments. 1. Plans now show further details whereby collection occurs well off the bridge, but still beneath the raised platform (refer to updated drawing 2124 attached). We confirm that there is no grate across the pedestrian/shared paths. 2. The grates on either side of the path are to be removable for regular maintenance/cleaning. Lifting eyes are provided in the deck panels to enable more substantial maintenance requirements 3. Agree with SAT. 4. The width of the paths is considered appropriate should a portion of the path need to be closed for normal maintenance activities. These activities should be able to be carried out with simple traffic/pedestrian management not requiring the complete closure of the paths.
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers response and add that all slot crossing grates should be to a healsafe standard.
Action Taken:	As per Client's decision, the design has been updated based on designer response.

2.5.2 *Shared Path Surfacing*

Minor

The drawings show the shared path across the Waikato River Bridge consists of a number of concrete deck panels which have a random surfacing pattern. The surfacing patterns on the concrete panels consist of exposed aggregate and rough sawn timber. The panels also have 20 mm wide x 300 deep grooves between the varying surface patterns.

The SAT are concerned the grooves and the varying texture within the concrete surface may cause a change in skid resistance for cyclists, e-scooters etc. and this will be a safety issue particularly in winter when there is likely to be frost on the surface. The varying surface pattern may also make it difficult for vision impaired pedestrians to know which part of the path they should be using.

Recommendation

Consider using a single surfacing pattern that has good skid resistance on the cycle lanes and ensure the grooves between surface patterns will not trap cycle tyres. Ensure the surfacing pattern does not cause confusion for vision impaired pedestrians.

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Infrequent	*Death or serious injury is Unlikely*	*Minor*

Designer Response: The designer acknowledges the SAT concerns. The varying pattern provides an aesthetic effect that HCC have a strong desire to implement on this bridge. The patterns depths are not too dissimilar to similar areas with exposed aggregates, surface imprinting, or paving stones used throughout the city. We will also seek further feedback from the preform fabricators to see if the (20mm) groove width can be reduced to 10mm.

Safety Engineer: Click here to enter text.

Client Decision: Agree with the SAT, exposed aggregate concrete can be very slippery under cycle tyres particularly when it is raining. Also concerned about the gaps in the surface for wheel chair users or other users with smaller diameter wheels, like push scooters, skateboards and e-skateboards as even 10mm is likely to at least make their ride uncomfortable, and therefore people may not choose to do that trip, or creating a 'trip' hazard at quite high speed. The difference between imprinting areas is that the pattern is close together over a small area which can be taken into account, I guess that these grooves will be spaced at about 2m intervals and if the rider forgets about them or is distracted just before riding over one they could hit one when not prepared and lose control. Suggest looking for other methods to provide the pattern effect.

Action Taken: The design has been amended to ensure grooves are no wider than 10mm and tapering to nothing. The contract has allowed for test panels to be created prior to manufacturing and installing the full path. These panels will be subject to various tests to ensure safety and final details to be approved by Client prior to mass production.

2.5.3 Planter Boxes and Seats Between Pedestrian Path and Cycle Path

Minor

The drawings show along the area between the pedestrian path and the cycle path on Waikato River Bridge there are planter boxes and seats at various intervals which are 500 mm wide x 440 mm high. The location of the planter boxes and seats are not shown on the bridge cross-section, but they will locally reduce the width of the cycle path and pedestrian path.

The SAT are concerned these will become a hazard for cyclists and depending on which way people sit on the seats there is the potential for them to have their legs encroaching into the cycle path.

Recommendation

Consider adding further design features to the seats to ensure people seated cannot obstruct the cycle lane, e.g. a backrest to discourage, and reduce the likelihood of a seated person being hit by a cyclist

Frequency Rating:	*Severity Rating:*	*Risk Rating:*
Crashes are likely to be Infrequent	*Death or serious injury is Unlikely*	*Minor*

Designer Response: We acknowledge the SAT's comments, but reflect that the described safety risk is minor, and less severe than many other locations on the wider network. The placement of seats/planters (if installed) are at approximately 50m spacings and there is ample visibility for cyclists and pedestrians to observe each other over the bridge. In addition, in comparison to other paths on the city network (that also provide adjoining seats) the path width is very wide (no less than 3.5m) and will readily allow manoeuvre space without conflict. Given these features are not fixed to the bridge deck we propose a "wait and see" approach, which can be addressed in the post-construction audit if deemed necessary.

Safety Engineer: Click here to enter text.

Client Decision: Agree with Designers response, but add that this street furniture should be heavy enough that that can't be pushed around by members of the public.

Action Taken: As per client decision, seats and planter-boxes are to remain. We confirm that furniture is heavy enough to avoid being pushed around by the public.

2.6 Other Safety Issues

2.6.1 Gates into Wetland Maintenance Access Roads

Minor

The wetland maintenance access roads off Weston Lea Drive and Echo Bank Place do not have any gates shown to prevent unauthorised vehicle access to these sites. If all vehicles can access these sites, they could be subject to 'boy racer' and/or other unsociable behaviour.

Recommendation:

Install gates and fencing to ensure that only authorised vehicles can enter the wetland maintenance sites off Weston Lea Drive and Echo Bank Place.

Frequency Rating:	***Severity Rating:***	***Risk Rating:***
Crashes are likely to be Infrequent	***Death or serious injury is Unlikely***	***Minor***

Designer Response: The designer agrees with the SAT regarding limiting vehicular access to maintenance vehicles only. HCC to confirm if the preferred method is to gate these accesses or whether removal bollards are preferred. The wetlands are not proposed to be fenced.

Safety Engineer: Click here to enter text.

Client Decision: If the desire is to allow pedestrians and cycles access down to track for recreation then padlocked removable bollards would suffice.

Action Taken: Padlocked removable bollards are to be installed as per client decision.

2.6.2 Rain Gardens on Peacockes Road and Weston Lea Drive West

Minor

The drawings show rain gardens at 40 m nominal centres along Peacockes Road and Weston Lea Road, which are adjacent to the footpath. In some locations, it appears that the street lights are located within the rain garden. This layout will make it difficult to obtain access to enable maintenance of the street lights.

Recommendation:

Check the position of the street lights and ensure they are not located within the rain gardens.

Frequency Rating:	Severity Rating:	Risk Rating:
Crashes are likely to be Infrequent	Death or serious injury is Very Unlikely	Minor

Designer Response:	The design has been amended to ensure light columns are not located within the rain gardens (refer to updated drawing 2631 attached).
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers response.
Action Taken:	As per Client's decision, the design has been updated based on designer response.

2.6.3 Fencing Around Wetland Ponds

Moderate

The wetland ponds will contain stormwater and the water depth will vary depending on the size of the rainfall event. The ponds are not fenced and in some locations the footpath is adjacent to the pond e.g. Wetland SWD02 on Weston Lea Drive West and there is the potential for children to enter the water from the footpath.

Recommendation:

Consider measures which would minimise the likelihood of children entering the water at these locations.

Frequency Rating:	Severity Rating:	Risk Rating:
Crashes are likely to be Infrequent	Death or serious injury is Likely	Moderate

Designer Response:	The designer acknowledges the SAT comments. The wetlands and rain gardens are not proposed to be fenced as that outcome has its own operational issues. In addition, HCC (and the wider stakeholders) have indicated that there is a strong desire for the community to be more socially aware, and integrated, with these types of stormwater features (i.e. outcomes from the City Well-Being programme as an example). Instead, the banks of the stormwater treatment devices are proposed to be planted to discourage direct access into deeper water areas, and the banks are very gently sloped to enable children/toddlers to be able to traverse the side slopes (on their own ability) if they did inadvertently enter the waterway.
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers response.
Action Taken:	As per Client's decision, the design remains unchanged.

2.6.4 Access to Property on (No 84) Weston Lea Drive East

Minor

Currently No 84 Weston Lea Drive obtains access from the existing cul-de-sac, but the design removes this section of road and the house remains. It is not clear how this property will obtain access to the new road. If access to this property is from the closed off section of Peacockes Road, the access road is likely to run parallel to new section of Peacockes Road which could confuse traffic on Peacockes Road particularly at night.

Recommendation:

Show the location of the access to 84 Weston Lea Drive. If it is from off the closed of section of Peacockes Road ensure the accessway is screened from traffic using the new section of Peacockes Road.

Frequency Rating:	Severity Rating:	Risk Rating:
Crashes are likely to be Infrequent	Death or serious injury is Very Unlikely	Minor

Designer Response:	This property has been purchased by HCC to enable these works. The access will not be required, and the house is to be removed (refer to drawing 1103 attached). Future development/re-establishment of the subject property would address any necessary screening requirements as part of those works.
Safety Engineer:	Click here to enter text.
Client Decision:	Agree with Designers Response.
Action Taken:	As per Client's decision, the design remains unchanged.

3 Audit Team Statement

We declare that we remain independent of the design team and have not been influenced in any way by any party during this road safety audit.

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed or modified in order to improve safety.

We have noted the safety concerns that have been evident in this audit and have made recommendations that may be used to assist in improving safety.

Signed ---------- Date 30/01/2020

Keith Moyes, NZCE (Civil), CMEngNZ (Engineering Technician), Senior Safety Engineer, WSP

Signed ---------- Date 30/01/2020

Glenn Coppard, NZCE (Civil), Technical Principal Transport Design, WSP

Signed ---------- Date 30/01/2020

Cherie Mason, MEngST (Transport), BSc, Cert Road Safety, Technical Principal Transportation, WSP

4 Response and Decision Statements

System designers and the people who use the roads must all share responsibility for creating a road system where crash forces do not result in death or serious injury.

4.1 Designer's Responses - Design Manager

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report and I have responded accordingly to each safety concern with the most appropriate and practical solutions and actions, which are to be considered further by the safety engineer (if applicable) and project manager.

Signed ---------- Date ----------

[Designer's name, qualification, position, company]

4.2 Safety Engineer's Comments – Hamilton City Safety Engineer

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report together with the designer's responses. Where appropriate, I have added comments to be taken into consideration by the project manager when deciding on the action to be taken.

Signed ---------- Date ----------

[Safety Engineer's name, qualification, position, company]

4.3 Clients Decision

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report, together with the designer's responses and the comments of the safety engineer (if applicable), and having been guided by the auditor's ranking of concerns have decided the most appropriate and practical action to be taken to address each of the safety concerns.

Signed ---------- Date 21 May 2020 ----------

Simon Crowther, NZCE (Civil), Senior Road Safety Engineer, Hamilton City Council

4.4 Action Taken – Project Manager

I certify that the project manager's decisions and directions for action to be taken to improve safety for each of the safety concerns have been carried out.

Signed ---------- Date ----------

Tahl Lawrence

4.5 Safety Audit Close Out

The project manager is to distribute the audit report incorporating the decisions to the designer, SAT leader, safety engineer, and project file.

Date:…….

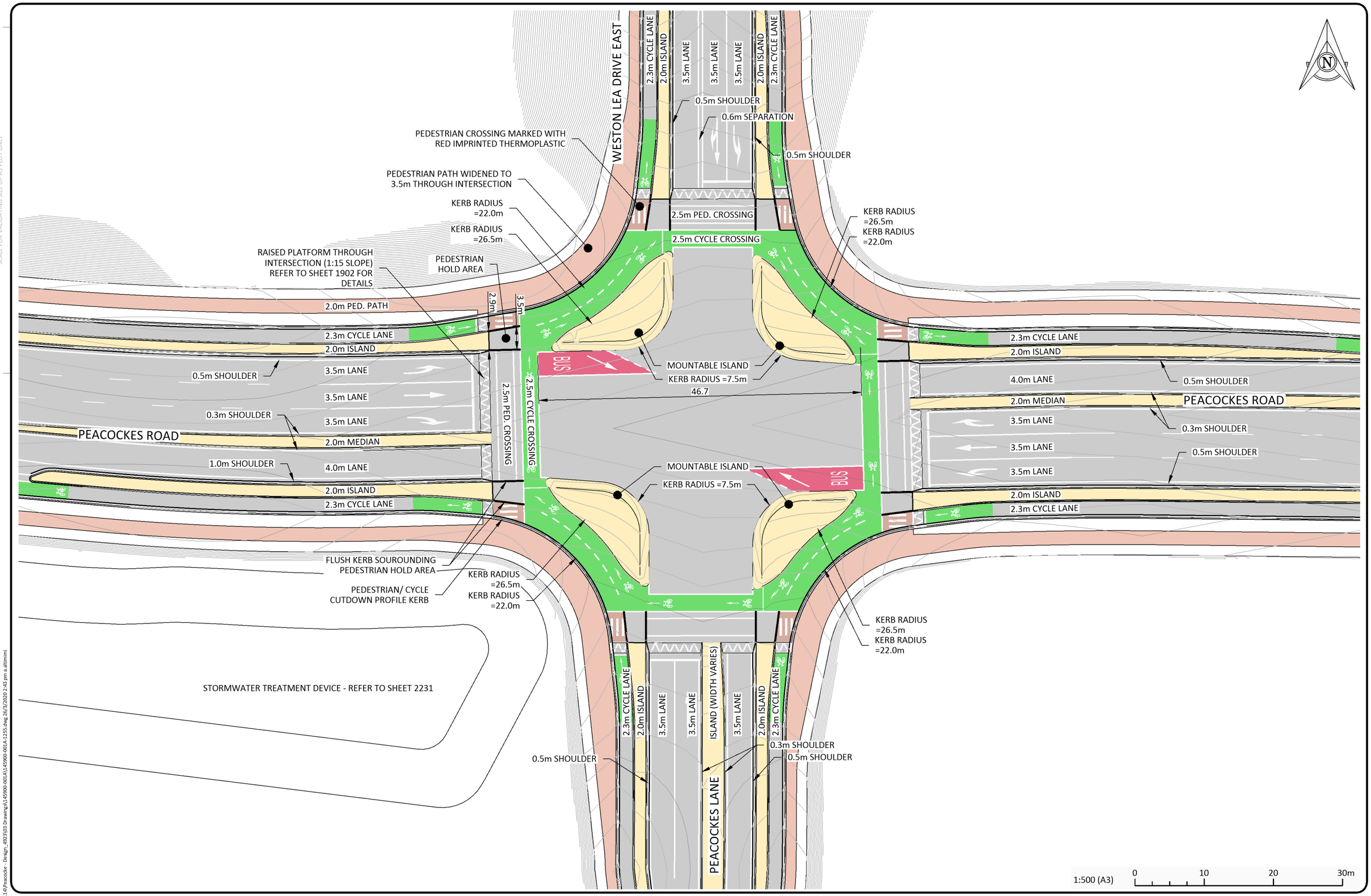
Appendix A
Peacocke Strategic Transport Project

Detailed Design Safety Audit

Documents Examined During the Audit

Preliminary 95% Design Issue: Project Number 145900-001A:

- Sheets 1000 - 6510



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						DRAWN AA	APPROVED JS	
0	27/03/2020	ISSUED FOR TENDER	AA	JS	JS	mx model version:		
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR			

BLOXAM BURNETT & OLLIVER

CLIENT: Hamilton City Council Te kaunihera o Kirikiriroa

PROJECT: PEACOCKE WAIKATO RIVER BRIDGE AND STRATEGIC SERVICES

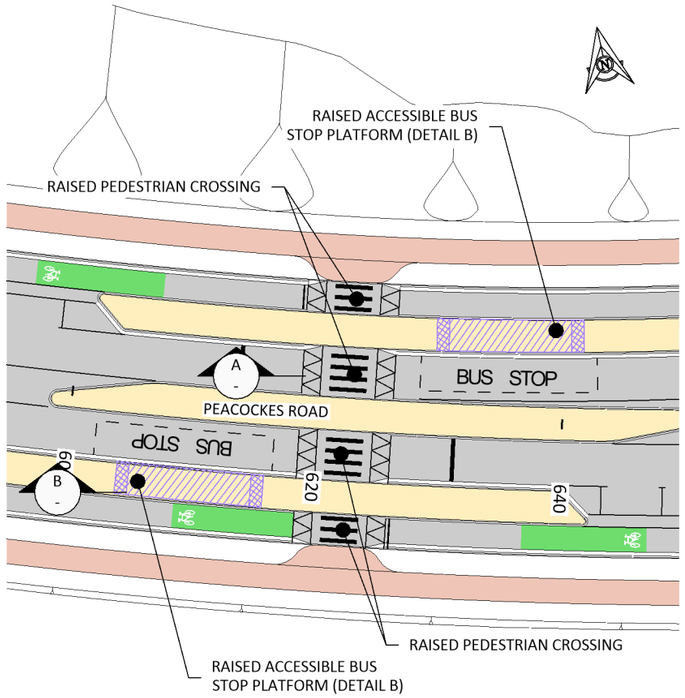
DRAWING: PEACOCKES ROAD - WESTON LEA DRIVE EAST INTERSECTION ENLARGEMENT PLAN

STATUS: TENDER

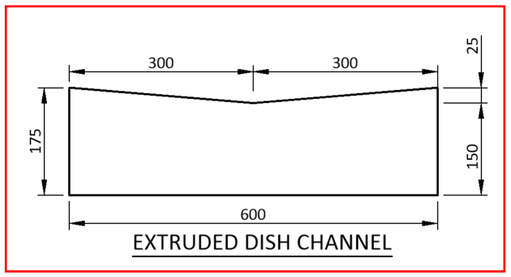
DATE: 23.08.2019 | SCALE (ORIGINAL SIZE A3): 1:500

DRAWING NUMBER: 145900-001A-1255 | REVISION: 0

Version 3.0 - September 2017



RAISED CROSSING & BUS STOP PLAN
SCALE 1:500



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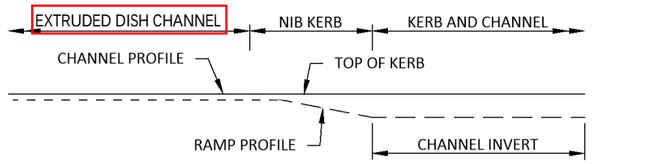

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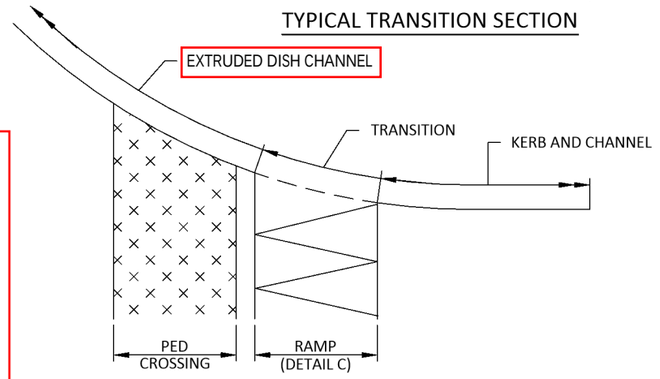
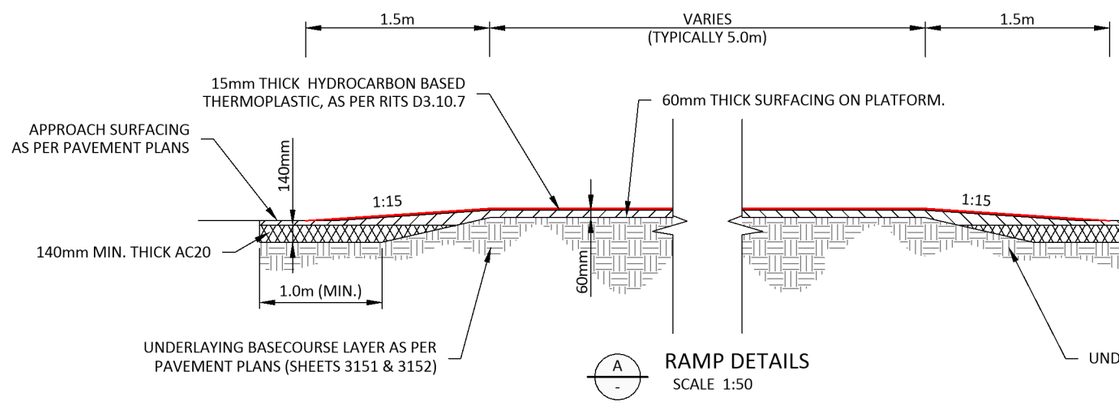


C
-
KERB TRANSITION DETAIL
NTS



A
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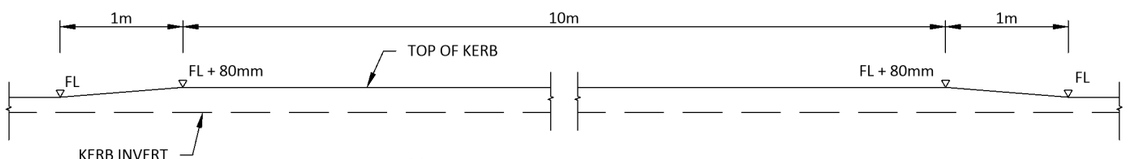
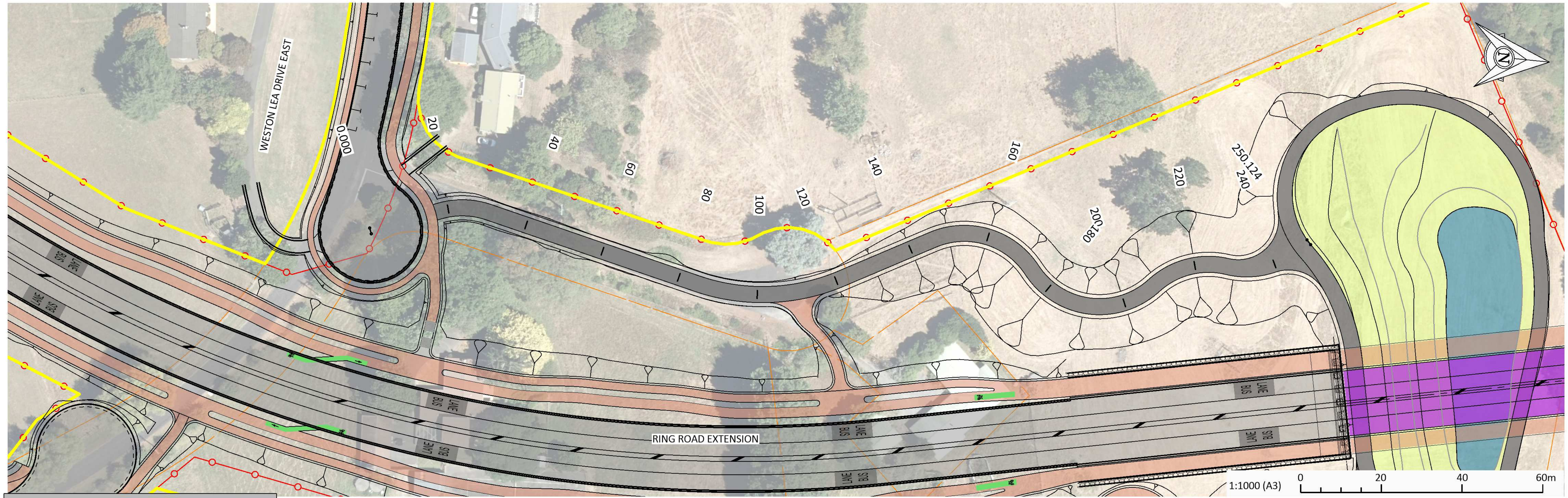
RAMP DETAILS
SCALE 1:50



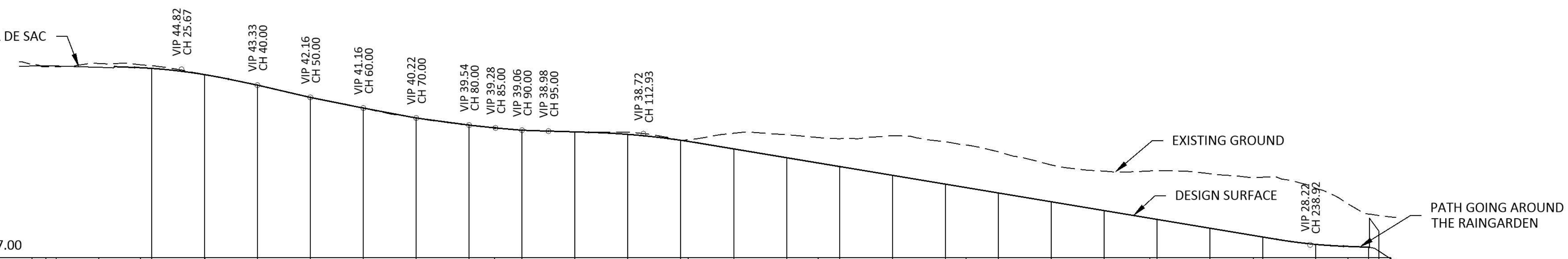
B
-
BUS STOP ACCESSIBLE PLATFORM
SCALE 1:50



KEY

- LEGAL BOUNDARY
- DESIGNATION BOUNDARY
- SITE EXTENTS *
- 100 DESIGN CENTRELINE
- PATH
- PROPOSED PAVEMENT AND MARKINGS
- EARTHWORKS

* REFER TO SHEET 1011 FOR SITE POSSESSION DATES



DATUM =27.00

HORIZONTAL DATA: D=17.92m; D=12.21m R=20.00 L=12.21; D=54.67m; D=36.59m R=-50.00 L=36.59; D=24.61m; D=27.9m R=20.00 L=27.90; D=34.7m R=-20.00 L=34.70; D=19.6m R=20.00 L=19.60; D=17.83m R=-20.00 L=17.83; D=4.1m

VERTICAL DATA: P=-2.00% L=3.84; K=2.10 L=17.65; P=-10.41% L=5.51; P=-11.65% L=10; ADOPTS EXISTING GEOMETRY L=10, L=10, L=10, L=10, L=5, L=5, L=5, L=7.59, 44%; K=3.00 L=20.67; P=-8.33% L=109.33; K=2.00 L=12.66; P=-2.00% L=4.88

CHAINAGE	CONTROL LEVELS	EXISTING GROUND	DEPTHS
0.00 / 0.00		45.05 / 45.05	
10.00		45.37	
20.00	44.91	45.16	0.25
30.00	44.32	44.34	0.02
40.00	43.33	43.33	0.00
50.00	42.16	42.16	0.00
60.00	41.16	41.16	0.00
70.00	40.22	40.22	0.00
80.00	39.54	39.54	0.00
90.00	39.06	39.06	0.00
100.00	38.91	38.91	0.00
110.00	38.67	38.87	0.20
120.00	38.11	38.11	-0.01
130.00	37.30	38.78	1.48
140.00	36.46	38.64	2.17
150.00	35.63	38.26	2.63
160.00	34.80	38.53	3.73
170.00	33.97	37.96	4.00
180.00	33.13	37.03	3.89
190.00	32.30	35.78	3.48
200.00	31.47	35.20	3.73
210.00	30.63	35.24	4.61
220.00	29.80	34.95	5.15
230.00	28.97	34.62	5.65
240.00	28.27	33.57	5.30
250.00 / 250.12	28.00 / 28.00	31.14 / 31.13	3.13 / 3.13

LONGSECTION ALIGNMENT RSPA0

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:500

C:\12dsynergy\data\10.7.120.14\Peacocke - Design_4923\03 Drawings\145900-001A\145900-001A-1273.dwg 26/3/2020 2:46 pm a.altimimi

REV	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR
0	27/03/2020	ISSUED FOR TENDER	AA	JS	JS

DESIGNED: LV | CHECKED: JS | DRAWN: AA | APPROVED: JS | mx model version:

BLOXAM BURNETT & OLLIVER

CLIENT: Hamilton City Council — Te kaunihera o Kirikiriroa

PROJECT: PEACOCKE WAIKATO RIVER BRIDGE AND STRATEGIC SERVICES

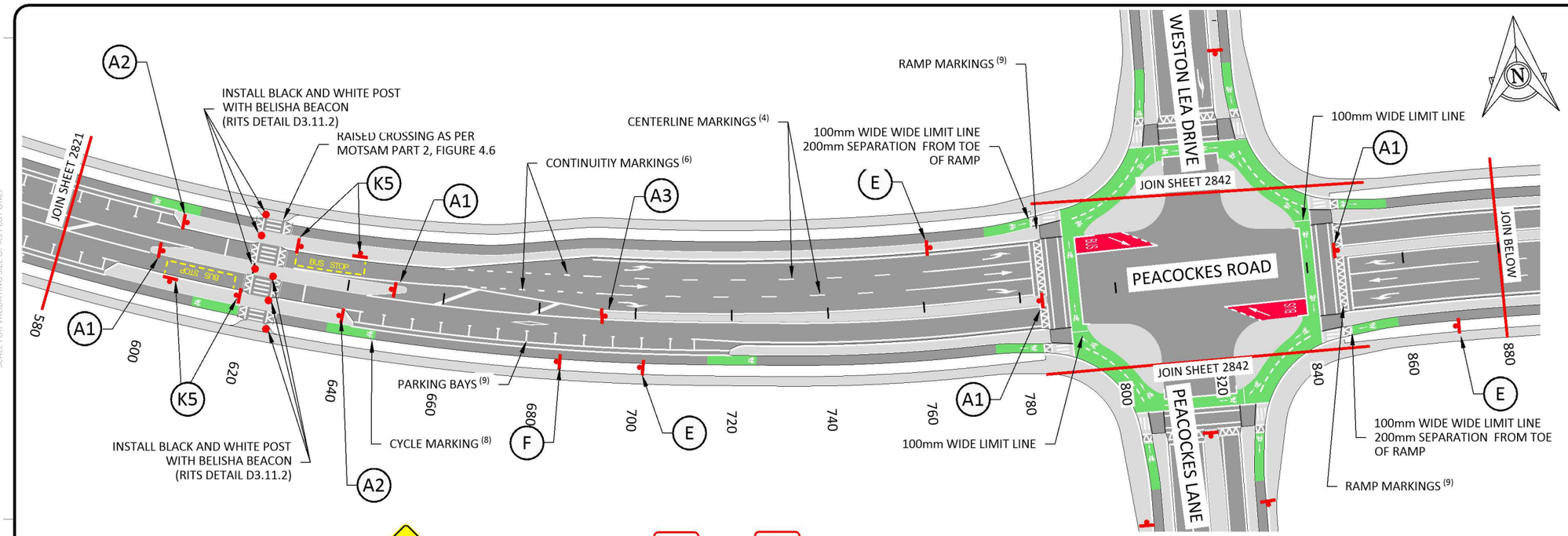
DRAWING: ACCESS TO RAINGARDEN RSPA0 - GENERAL ARRANGEMENT PLAN AND LONGSECTION SHEET 1

STATUS: TENDER

DATE: 04.11.2019 | SCALE (ORIGINAL SIZE A3): 1:1000

DRAWING NUMBER: 145900-001A-1273 | REVISION: 0

Version 3.0 - September 2017

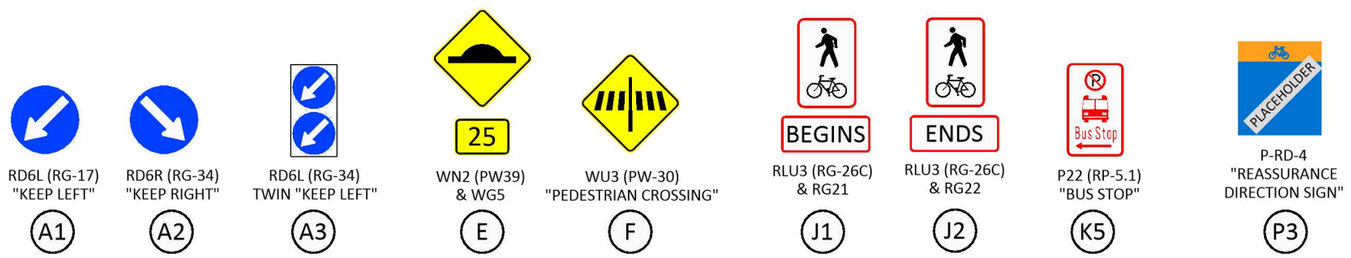


LEGEND

- CARRIAGEWAY (MARKINGS)
- PEDESTRIAN/CYCLE PATH
- CYCLE MARKINGS (8)
- BUS MARKINGS (9)
- NEW SIGN

PAVEMENT MARKING NOTES:

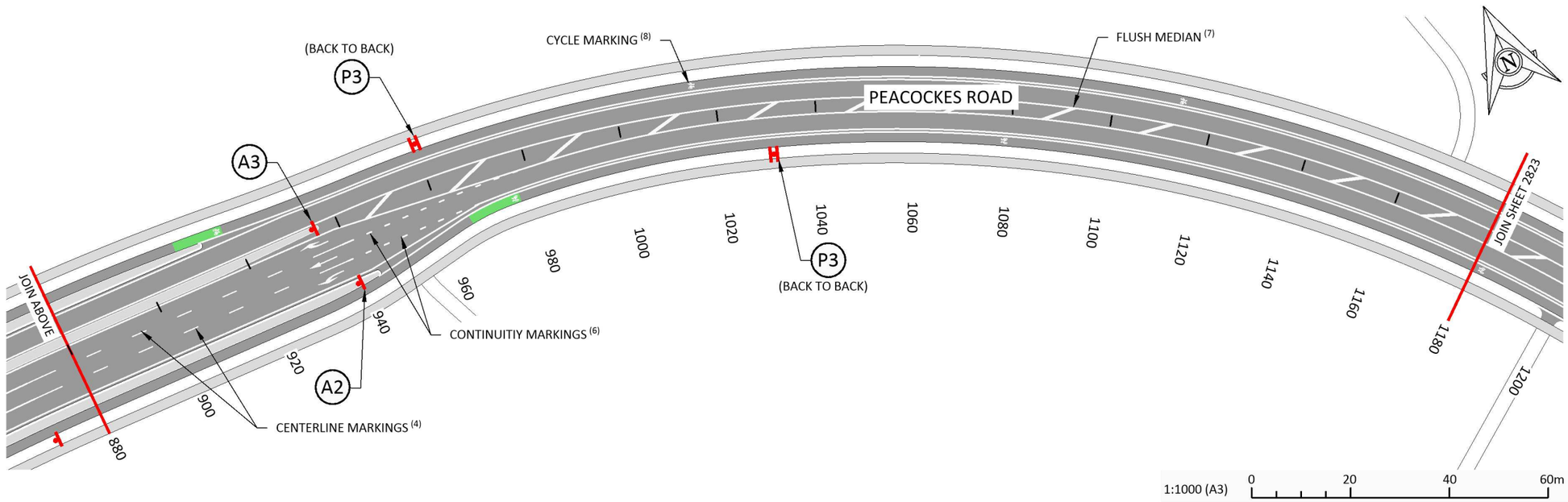
1. ALL SIGNS AND MARKINGS TO BE IN ACCORDANCE WITH NZTA TRAFFIC CONTROL DEVICE MANUAL (TCD) AND MOTSAM
2. ALL EDGELINES AND MEDIAN MARKINGS TO BE 100mm WIDE, SOLID WHITE, REFLECTORISED (UNLESS STATED OTHERWISE)
3. ALL LIMIT LINES TO IN ACCORDANCE WITH MOTSAM PART 2, SECTION 3.06
4. ALL CENTERLINES TO BE 3m LINE, 7m GAP
5. ALL NO STOPPING LINES TO BE YELLOW, 1m LINE, 1m GAP.
6. ALL CONTINUITY LINES TO BE 1m LINE, 3m GAP (UNLESS STATED OTHERWISE)
7. FLUSH MEDIAN MARKINGS TO BE IN ACCORDANCE WITH MOTSAM PART 2, FIGURE 2.9. CHEVRONS TO BE AT 20m CRS
8. CYCLE LANE SYMBOLS TO BE AT 100m INTERVALS, GREEN MARKINGS TO BE AS MARKED ON PLANS
9. REFER TO DRAWING 2850 FOR BUS MARKING, PARKING DETAILS AND RAMP MARKINGS



SIGN DIMENSIONS

ALL SIGN SIZING TO BE IN ACCORDANCE WITH TCD PART 1, SECTION 5.2.3. SUMMARISED IN TABLE BELOW

	RING ROAD EXTENSION	ALL OTHER ROADS
GENERAL		
CIRCULAR DISC & REGULATORY SPEED SIGNS	750Ø	600Ø
DUAL "KEEP LEFT" CIRCULAR DISC (RD6R) 300Ø	300Ø	300Ø
PERMANENT WARNING SIGNS (DIAMOND) 750x750	750x750	600x600
CHEVRON SIGHT BOARD		
SINGLE DIRECTION (WYR2)	1200x450	1200x450
T-JUCTION (WYT3)	3000x600	3000x600
REGULATORY PLATES & BOARDS		
SHARED PATH & CYCLE PATH (RLU3/RLU1)	400x600	400x600
BUS REGLUATORY (RLB1)	750x750	750x750
SINGLE DISC 'KEEP LEFT/RIGHT' (RD6L/RD6R)	600Ø	600Ø
DUAL DISC 'KEEP LEFT' SIGN (RD6R)	300Ø	300Ø
GIVE WAY (RP2 & RP21)	865x750	865x750
SAFER SPEED AREA THRESHOLD (RS55)	900x1500	900x1500
SUPPLIMENARY PLATES *(RG1, RG21, RG22)*		
ON SHARED PATH/CYCLE PATH	600x250	600x250
ON BUS REGULATORY	750x300	750x300
AB42 "AHEAD"	900x300	900x300
ADVISORY SPEED (WG5)	750x500	600x400



						DESIGNED CM	CHECKED JS	
						DRAWN AA	APPROVED JS	
0	27/03/2020	ISSUED FOR TENDER	AA	JS	JS	mx model version:		
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR			

Version 3.0 - September 2017

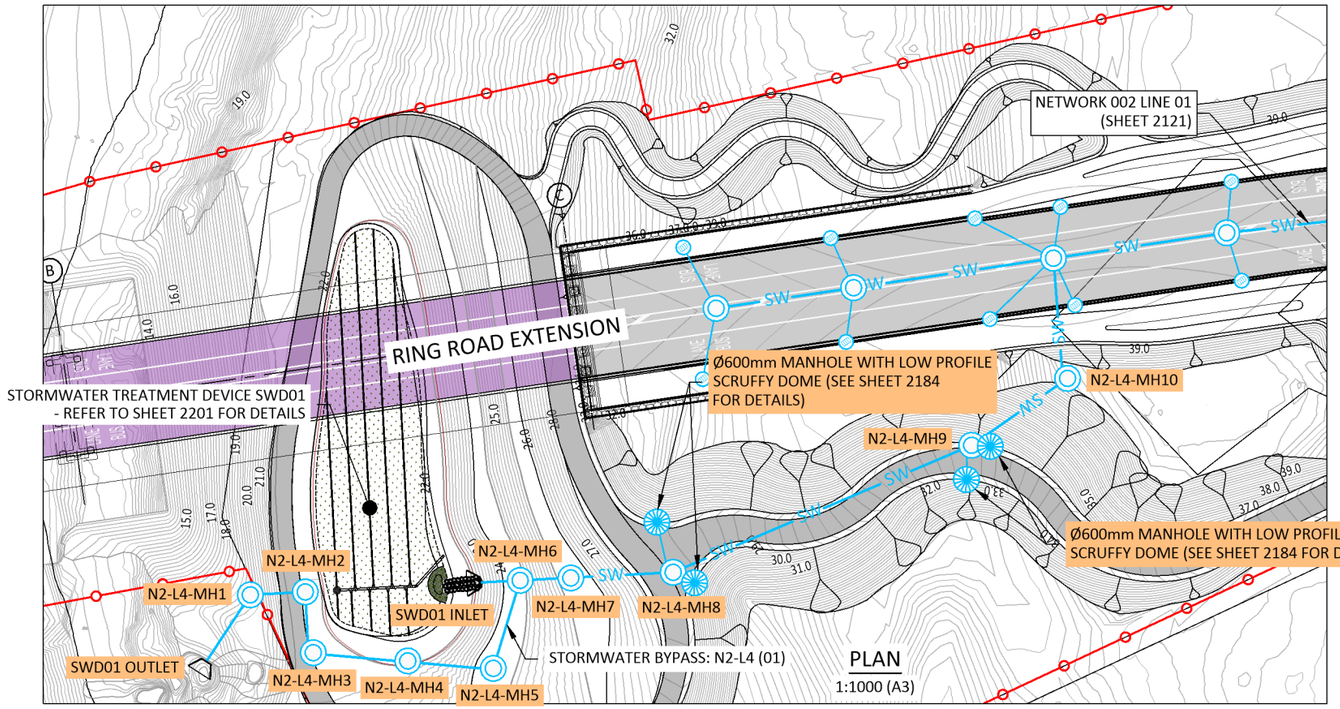
BLOXAM BURNETT OLLIVER
Phone +64-7-838 0144, Fax +64-7-839 0431

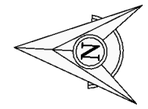
CLIENT: Hamilton City Council, Te kaunihera o Kirikiriroa

PROJECT: PEACOCKE WAIKATO RIVER BRIDGE AND STRATEGIC SERVICES

DRAWING: PEACOCKES ROAD - SIGNS AND MARKINGS PLAN SHEET 2

STATUS: TENDER
DATE: 19.08.2019
SCALE (ORIGINAL SIZE A3): 1:1000
DRAWING NUMBER: 145900-001A-2822
REVISION: 0

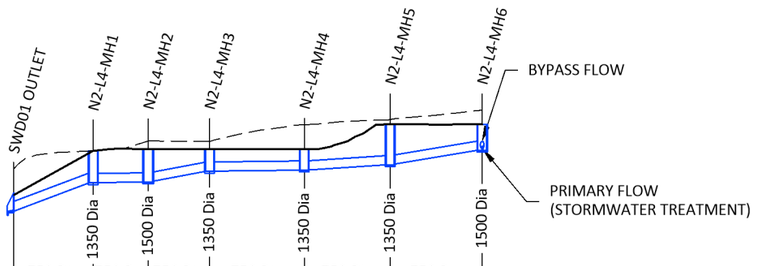




KEY

- LEGAL BOUNDARY
- DESIGNATION BOUNDARY
- PROPOSED CARRIAGEWAY EDGE
- PROPOSED CONTOURS
- SW — EXISTING STORMWATER
- SW — PROPOSED STORMWATER PIPE
- R1 — PROPOSED RAIN GARDEN (REF #)
- EXISTING/PROPOSED STORMWATER MANHOLE
- EXISTING/PROPOSED CATCHPIT

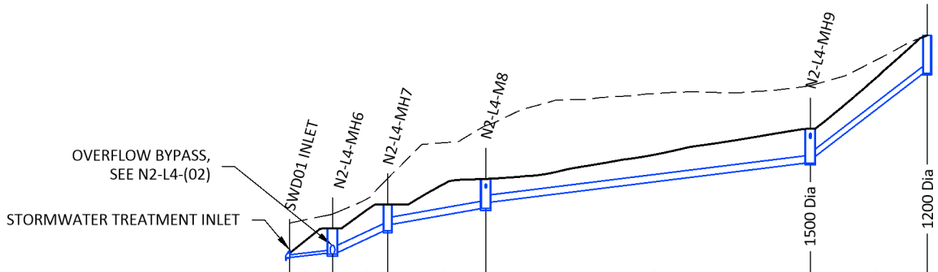
REFER TO SHEET 2100 FOR STANDARD NOTES
(MANHOLE SIZE, CATCHPIT CONFIGURATION
& PIPE CLASS/TYPE)



DIAMETER		750 Dia		750 Dia		750 Dia		750 Dia		750 Dia		750 Dia	
GRADE		17.87%		0.50%		8.07%		0.50%		3.00%		7.53%	
DATUM R.L.	2.00												
DEPTH TO INVERT OF PIPE	3.42	2.61	2.59	2.67	2.60	1.80	1.78	1.72	1.70	3.30	3.24	2.10	
INVERT LEVEL	16.95	19.27	19.29	19.33	19.40	20.21	20.23	20.30	20.32	20.74	20.80	21.93	
DESIGN SURFACE LEVEL	20.37	21.88		22.00		22.01		22.02		24.04		24.03	
EXISTING SURFACE LEVEL	20.37	21.88		22.68		22.64		24.01		24.44		25.21	
CHAINAGE		-4.13	8.85		17.82		27.82		43.29		57.29		72.29
PIPE LENGTH		12.98		8.97		10.00		15.47		14.00		15.00	

NOTE:
STORMWATER NETWORK 002-LINE 04
TO BE INSTALLED WITH H2 BEDDING,
HAUNCHING SIDE AND OVERLAY ZONES

N2-L4 (01)
SCALE 1:1000 (HORIZ), 1:500 (VERT)



DIAMETER		225 Dia	600 Dia	600 Dia		600 Dia		600 Dia		
GRADE		4.72%	19.89%	8.09%		6.02%		35.71%		
DATUM R.L.	10.00									
DEPTH TO INVERT OF PIPE	0.32	0.32	2.00	2.10	2.14	1.62	2.42	1.90	2.80	2.28	3.09	3.02
INVERT LEVEL	21.70	21.70	22.03	21.93	23.85	24.37	25.66	26.18	29.37	29.89	36.70	36.77
DESIGN SURFACE LEVEL	22.02	24.03		25.99		28.08			32.17		39.79	
EXISTING SURFACE LEVEL	24.48	25.21		28.12		32.42			35.69		39.79	
CHAINAGE		0.00	7.00	16.00		32.00			84.92		103.98	
PIPE LENGTH		7.00	9.00	16.00		52.92			19.07			

N2-L4 (02)
SCALE 1:1000 (HORIZ), 1:500 (VERT)

0	27/03/2020	ISSUED FOR TENDER		AA	JS	JS							
DATE		ISSUE/REVISION DETAIL		BY	CHK	APPR							

DESIGNED: BM | CHECKED: JS
DRAWN: DSB | APPROVED: JS
mx model version:

BLOXAM BURNETT & OLLIVER

CLIENT: Hamilton City Council
Te kaunihera o Kirikiriroa

PROJECT:
PEACOCKE
WAIKATO RIVER BRIDGE
AND STRATEGIC SERVICES

DRAWING:
STORMWATER RETICULATION
NETWORK 002 - LINES 01 & 04
PLAN AND LONGSECTION

STATUS: TENDER
DATE: 27.03.2020
SCALE (ORIGINAL SIZE A3): AS SHOWN
DRAWING NUMBER: 145900-001A-2124
REVISION: 0